

CLAIMS

We Claim:

5 1. A microfluidic device for handling a sample, comprising:
a substrate;
a reaction channel defined on the substrate along which the sample migrates;
a sample channel defined on the substrate from which the sample is introduced into the
reaction channel; and
10 a constricted conduit interface in fluid coupling between the reaction channel and sample
channel, through which the sample is injected from the sample channel into the reaction channel.

20 2. A microfluidic device as in claim 1, wherein the constricted conduit comprises a
relatively short and narrow channel in comparison to the sample channel.

25 3. A microfluidic device as in claim 1, wherein the constricted conduit comprises a
constricted opening.

20 4. A microfluidic device as in claim 1, wherein the constricted opening is in the
form of a pinhole.

25 5. A microfluidic device as in claim 1, wherein the constricted conduit is configured
and sized to have at least one of the following characteristics: prevent sample diffusion from the
sample channel into the reaction channel, improve structural dimension control in fabrication,
and reduce augmented electrophoretic mobility-based bias of sample from the sample channel.

30 6. A microfluidic device as in claim 1, wherein two ends of the sample channel are
in fluid communication with a sample reservoir and a waste reservoir defined on the substrate,
respectively.

7. A microfluidic device as in claim 1, wherein the sample channel is in fluid communication with a sample source external of the substrate.

8. A microfluidic device as in claim 7, wherein the sample channel takes the form of
5 a through-hole provided in the substrate to facilitate introduction of sample into the reaction channel.

9. A microfluidic device as in claim 8, wherein the through-hole collects sample when sample is loaded on the through-hole from the external source.

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10. A microfluidic system, comprising:

a substrate;

a reaction channel defined on the substrate along which the sample migrates;

a sample channel defined on the substrate from which the sample is introduced into the reaction channel;

a constricted conduit interface in fluid coupling between the reaction channel and sample channel, through which the sample is injected from the sample channel into the reaction channel;

a capillary tube having a first end depositing fluid on the sample-channel, and a second end coupled to at least one of a sample reservoir and an auxiliary buffer reservoir; and

20 means for delivering sample and buffer to the sample channel via said capillary tube from said at least one of a sample source and an auxiliary buffer reservoir.

11. A microfluidic system as in claim 10, wherein the second end of the capillary tube is supported to access multiple samples in series from multiple sample reservoirs.

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12. A method for injecting sample into a reaction channel defined on the substrate of a microfluidic device, comprising the steps of:

defining on the substrate a sample channel from which the sample is introduced into the reaction channel;

defining a constricted conduit interface in fluid coupling between the reaction channel and sample channel, through which the sample is injected from the sample channel into the reaction channel; and

5 applying a driving force to injecting the sample from the sample channel into the reaction channel through the constricted conduit.